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NEW THINGS IN WEATHER SCIENCE

A radio talk by C. F. Marvin, Weather Bureau, delivered through WRC and 39 other radio stations associated with the National Broadcasting Company, November 26, 1930.

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Good morning, my good friends of the farms and homes of our great nation! I know that the weather has misbehaved itself shamefully during the growing seasons of this year, and that the unusual extremes of heat and lack of rains have brought on serious losses to many of you. In a joking way the Weather Man is charged with at least a share of responsibility for all this, and perhaps, therefore, he is not entitled to address you as his good friends. However, down deep in your hearts you know he is not to blame, and I confidently believe my words of friendly greeting set in vibration within those who hear me a responsive chord of friendship for me and my staff, notwithstanding the human limitation surrounding our efforts to serve you.

I wonder how many of you realize that on the basis of the last census the portion of federal taxation required to maintain all the activities of the Weather Bureau is met by a direct or indirect contribution from each person in the continental United States less than four cents each.

When you feel like scolding the Weather Man sometimes, just stop and ask if he has not given you much more than four cents worth of good and useful service.

When the drought situation became acute last summer and the Government began its inquiry after facts and set in motion the machinery to accomplish relief, your Weather Man was right there with reports, maps and diagrams which told the whole story in so far as the weather and its influence on crops, water supply, etc., were concerned. Wild guesses, speculation, local exaggerations and misrepresentations, all of which would have been unrestrained without the stabilizing presence of the Weather Man, - all simply died in conception before the array of weather facts placed almost daily in the hands of Secretary Hyde and President Hoover.

In our annual report is given a succinct account of drought conditions up to September 1, including comparisons with other years and other useful information. Those wishing copies of this should apply to the Chief of the Weather Bureau, Washington, D. C.

Throughout the summer, we have given, over and over again, the best answer we could to the question "what is the cause of such heat waves and droughts". Perhaps some of you have read these answers in one form or another in the newspapers. Let me tell you in my own words very briefly what can be said on this subject.

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No one can assign, exactly and specifically, any one ultimate cause for such conditions. In fact, we recognize that several factors are involved in more or less intricate operations, and the ultimate cause of all can not as yet be clearly traced. Moreover, droughty conditions of greater or less severity prevail for times and in some sections almost every year, but when considered in all its details of extent, duration and severity, the drought of the summer of 1930 easily takes first place in the climatological history of these conditions for the country.

About all we can say on the question of cause is that these unusual conditions are best explained as a prolonged stagnation of the air over nearly the whole continental extent of the United States. In ordinary years this great blanket of atmosphere overlying the continent is in more or less active circulation. Cool air from the polar regions moves southward from time to time. This feature of circulation has been especially absent this summer. When air from the tropical latitudes moves northward at intervals. Air from the oceans and Gulf moves inland, and there is a more or less active and continuous interchange of these different air masses, causing the agreeable and favorable conditions that prevail in ordinary years. This circulation and interchange has been conspicuously absent for a long time during the present great drought.

During this stagnation the occasional showers and thunder-storms here and there over the drought-stricken region served only to dry out the overlying air masses. Only a part, at best, of the water falling in such storms is evaporated back into the free air, and with little or no moisture borne in by winds from the oceans, each successive inland shower, coupled with the stagnation and absence of general rain-causing processes, tends to further deplete the moisture supply and intensify ^{of} the drought condition. It may be pointed out, also, that over most of the United States the summer heat is normally at its maximum about the last week of July. Therefore, we say that summertime stagnation and lack of active circulation within the continental air blanket is the immediate cause of the absence of precipitation and this permits the culmination of excessive temperatures, but the experts are unable to assign a specific cause for the prolonged stagnation. It may be added that the stagnation over the United States involved in part at least British North America, whereas the interflow of polar and equatorial air over Europe and Asia seems to have been more active than usual, if we may judge by storms, floods, etc., reported from those continents. On this basis we might infer that the usual outflows of cold polar air has not been sufficient, or it has not been cold enough to give a generous supply to the whole circumpolar zone. Europe and Asia seems to have drawn down more than their fair share. We must hope for a better distribution next summer.

I think it is my duty to tell you that, notwithstanding various claims and alleged demonstrations, it has not been proven that droughts occur and recur in certain long or short cycles, or that they are correlated in any physical way with sunspots. Moreover, we know that they can not be broken; that is, copious or even appreciable amounts of precipitation can not be caused by any kind of aerial bombardment or by sprinkling the clouds with insignificant amounts of electrified sand, liquid air, or chemicals of any kind, or by the use of

flocks of airplanes in any way, as some propose. All the efforts and forces at the disposal of man provide only puny and insignificant fractions of the lavish stores of energy required and expended by nature in causing and maintaining even a single rainstorm over a limited area.

It is easy to calculate that quite a thousand billion tons of water were needed to make up the deficits in continental rainfall last summer. Nature's way of supplying this water is chiefly by picking it up from the Gulf and contiguous ocean areas as tenuous, invisible vapors which are borne inland by the intercirculation I have described, and there by cooling processes released as rains. ~~Energy~~ transformations of billions of horse power are involved in the processes, placing them utterly beyond puny man power.

Out of the less than four cents each person contributes to the maintenance of the Weather Bureau, we are spending about one cent to make it safer to send your letters and parcels by air mail, and to assure those who wish to travel by airplanes that it will be safe to do so as far as the weather factor is concerned. Those of you who procure a copy of our annual report will find this service quite fully described.

To-morrow is the day of annual Thanksgiving for the American people. The year has brought us its problems and losses, some seemingly more serious than in other years. Nevertheless, the atmospheric circulation seems to be more or less normal, beneficial rains have come to nearly every section, and our weather map this morning shows that fair and sunshiny weather prevails.

We may all feel confident that the spirit of optimism and the great latent energy of the American people will effectively carry us over this temporary ebb in our affairs and bear us onward and upward on the never-falling wave of national prosperity.

